MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

DCT5038 – DATA COMMUNICATIONS AND NETWORKING

(DIT & DBIS)

16 OCTOBER 2015
3:00 p.m – 5:00 p.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **FOUR (4)** pages (excluding the cover page).
2. Answer **ALL FIVE (5)** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the **Answer Booklet** provided.

Instruction: Answer all questions in the Answer Booklet provided.

QUESTION 1

[20 Marks]

a. Define data communications. (2 Marks)

b. Draw a star-ring hybrid topology which consists of a main three branch star topology with each branch connecting three stations in a ring topology. (4 Marks)

c. Match the following to one or more layers of OSI model:

i. Route determination (1 Mark)

ii. Format and code conversion services (1 Mark)

iii. Ensure reliable transmission of data (2 Marks)

iv. Login and logout procedure (1 Mark)

v. Interface to transmission media (1 Mark)

d. Describe phase and wavelength of an analog signal. (4 Marks)

e. A device is sending a data at a rate of 1000 bps.

i. Calculate a bit interval. (2 Marks)

ii. How long does it take to send 10 bits? (2 Marks)

QUESTION 2

[20 Marks]

a. Draw a digital signal of a data stream 10001011 with the encoding below.

i. NRZ-I (3 Marks)

ii. Differential Manchester (3 Marks)

b. Differentiate between parallel transmission and serial transmission. (2 Marks)

c. Figure 1 shows a time domain for an 8-QAM signal. Draw a constellation diagram based on the signal given. (4 Marks)

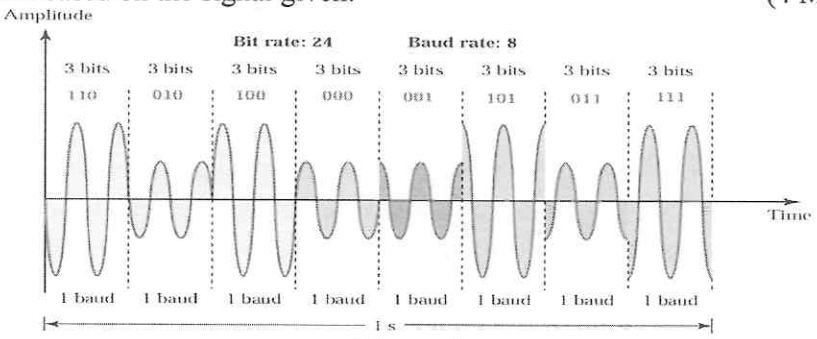
Amplitude
Bit rate: 24
Baud rate: 8
3 bits 3 bits 3 bits 3 bits 3 bits 3 bits 3 bits 3 bits
110 010 100 000 001 101 011 111
Time
1 baud 1 baud 1 baud 1 baud 1 baud 1 baud 1 baud 1 baud
1 s

Figure 1

d. Assume there are 14 sources with each of the source creates 200 8-bit character per second are multiplexed using TDM. Each output slot carries 4 bits from each source at a time but additional 4-bit are added to each frame for synchronization. Answer the following questions:

i. Size of a frame in bit. (2 Marks)

ii. Frame rate. (2 Marks)

iii. Date rate on the output. (2 Marks)

e. Define direct sequence spread spectrum (DSSS). (2 Marks)

QUESTION 3 [20 Marks]

a. Distinguish between step-index and graded-index fiber. By comparing both fibers, which fiber has less distortion? (5 Marks)

b. Table 1 shows behaviors of two type of waves.

Table 1

	A	***B***
Frequency	3 KHz – 1 GHz	300 GHz – 400 THz
Application	AM and FM radio	IrDA port on keyboard

i. Identify the waves of ***A*** and ***B***. (2 Marks)

ii. Give **TWO (2)** behaviors for each of the wave. (4 Marks)

Continued.....

c. Define a simple parity check. What kind of error can a simple parity check detects? (4 Marks)

d. Assume that a receiver received a codeword of 10111010111 from a sender. By using Hamming code, determine the position of the error. (5 Marks)

QUESTION 4 **[20 Marks]**

a. Distinguish **ONE (1)** similarity and **TWO (2)** differences between Go-back-N ARQ protocol and Selective Repeat ARQ protocol. (5 Marks)

b. High-level Data Link Control (HDLC) defines three types of frames. What type of message does each of the frame carries:

i. I-frames (1 Mark)

ii. S-frames (1 Mark)

iii. U-frames (1 Mark)

c. Carrier Sense Multiple Access (CSMA) was developed to solve the problem of collision. Answer the following questions:

i. Describe the operation of CSMA. (2 Marks)

ii. Why it is said that CSMA not able to fully solve the problem of collision? (2 Marks)

d. List and briefly explain the functions of **THREE (3)** controlled access methods. (6 Marks)

e. Briefly describe Bluetooth Local Area Network. (2 Marks)

QUESTION 5 **[20 Marks]**

a. Briefly explain a Frequency-Division Multiple Access (FDMA). (3 Marks)

b. With the aid of diagram, explain Extended Service Set (ESS) in IEEE 802.11. (5 Marks)

Continued.....

c. What are the advantages of dividing an Ethernet LAN with a bridge?
(2 Marks)

d. Gigabit Ethernet can be categorized into two implementation categories. What are these **TWO (2)** categories? What are the cable(s) used in each of the category?
(5 Marks)

e. Explain the Virtual Circuit Identifier.
(3 Marks)

f. What is the main difference between circuit-switched and a packet-switched network?
(2 Marks)

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